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PLANETARY PHENOMENA FOR JULY AND AUGUST, 1907.

By Malcolm McNeill.

PHASES OF THE MOON, PACIFIC TIME.

Last Quarter...	July 2,	6^{h} 34^{m} A.M.	New Moon....	Aug. 8,	10^{h} 36^{m} P.M.
New Moon	" 10,	7 17 A.M.	First Quarter..	" 16,	1 5 P.M.
First Quarter...	" 18,	5 12 A.M.	Full Moon.....	" 23,	4 15 A.M.
Full Moon	" 24,	8 30 P.M.	Last Quarter..	" 30,	9 28 A.M.
Last Quarter...	" 31,	6 25 P.M.			

The Earth reaches aphelion—that is, reaches its greatest distance from the Sun—July 5th, 7 A.M. Pacific time.

There will be two eclipses during July. The first is *an annular eclipse of the Sun* on July 10th, not visible in the United States. The path of central eclipse begins in the South Pacific, crosses South America, and ends in the South Atlantic.

The second is *a partial eclipse of the Moon* on the evening of July 24th. The beginning of the actual eclipse is visible generally throughout North America except the northwest portion, and the end throughout North America except Alaska. The principal phases are as follows, Pacific time:—

Moon enters penumbra,	July 24, 5^{h} 59^{m} P.M.
Moon enters shadow..	7 4 P.M.
Middle of the eclipse..	8 22 P.M.
Moon leaves shadow...	9 41 P.M.
Moon leaves penumbra	10 46 P.M.

The maximum obscuration of the Moon is a little more than six tenths of the Moon's diameter.

Mercury on July 1st is an evening star, having passed greatest east elongation on June 27th, and sets about an hour and one half after sunset. It is therefore at this time in fine position for observation, but it soon draws too near the Sun to be seen, and passes inferior conjunction on the evening of July 24th, becoming a morning star. It then moves rapidly away from the Sun, reaching greatest west elongation (18° 51′) on August 12th. It then rises about an hour and one half before sunrise and will be an easy object in the morning twilight. By the end of the month it has nearly reached superior conjunction with the Sun.

Venus is still a morning star, rising $1^h\ 24^m$ before sunrise July 1st, $1^h\ 3^m$ August 1st, and less than half an hour before on August 30th. It cannot easily be seen by the naked eye much after the first week in August. By the end of that month it will nearly have reached superior conjunction with the Sun.

During the latter part of July and through August *Mercury, Venus, Jupiter,* and *Neptune* are all very close together in the early morning sky just above the eastern horizon, and a good many conjunctions occur. *Mercury* is in conjunction with *Jupiter* July 31st, 8 P.M., and with *Venus* at 5 A.M. on August 1st,—not very close approaches, *Mercury* being nearly 5° south in each case. Next, on August 1st, 9 A.M., *Venus* and *Jupiter* are in conjunction, *Venus* being only 18′ north of *Jupiter*. *Mercury* and *Jupiter* are again in conjunction on August 10th, *Mercury* 2° 5′ south.

Mars comes to opposition with the Sun July 6th, 7 A.M. Pacific time, and is then above the horizon during the entire night. On August 1st it is above the horizon until about 2 A.M., and on August 31st it sets about half an hour after midnight. During most of the period it is moving westward, having begun this motion on June 5th. From July 1st to August 13th it moves about 8°, going back along a line somewhat south of its eastward motion in the spring, and at the latter date it occupies a position among the stars 5° south of its position on April 18th. From August 13th it moves eastward again, making about 4° before the end of the month, on a line a little north of the preceding westward motion. It does not reach its minimum distance from the Earth until July 13th, a week after opposition, and throughout July its distance varies only a little more than two millions of miles. During August the distance increases by about ten millions, and by the end of the month the brightness will diminish perceptibly, but will still exceed that of any of the fixed stars.

Jupiter is still an evening star on July 1st, but sets less than an hour after sunset, and it will not be an easy object for naked-eye observation. It comes to conjunction with the Sun July 15th, 11 P.M., and becomes a morning star. On August 1st it rises about an hour before sunrise, and on August 31st nearly three hours before.

Saturn rises at about $11^h\ 30^m$ P.M. on July 1st, at about $9^h\ 30^m$ P.M. on August 1st, and before $7^h\ 30^m$ P.M. on August

31st. It moves about 7° westward and 1° southward in the constellation *Pisces*. On July 1st the Earth is below and the Sun above the plane of the rings, so that we still have the dark face of the rings toward us. About July 25th the plane of the rings crosses the Sun, and from then until October Sun and Earth are on the same side of the plane. The rings are seen nearly edgewise, the minor axis being in the maximum at the end of July not more than four per cent of the major in the apparent ellipse, and this will diminish as the Earth approaches the plane of the rings.

Uranus is in opposition to the Sun on July 3d, and is then above the horizon during the entire night. On August 1st it sets at about 2^h 40^m A.M., and at about 12^h 40^m A.M. on August 31st. During the two months it moves about 2° westward in the constellation *Sagittarius* north of the "milk-dipper." *Uranus* is not far from *Mars* throughout the two months, and is in conjunction with it twice,—on July 19th, when *Mars* passes 5° 18′ south of it, and again on August 24th, when *Mars* passes 4° 37′ south, the motion of *Mars* being westward on the first occasion and eastward on the second.

Neptune is in conjunction with the Sun on the morning of July 5th, and becomes a morning star.